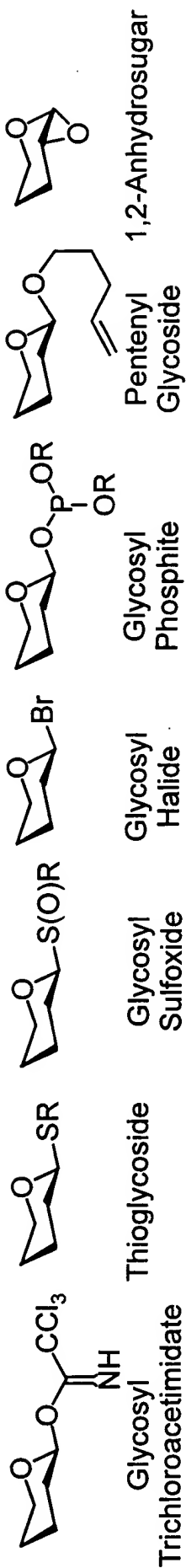


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1/22



Commonly used glycosylating agents

FIG. 1

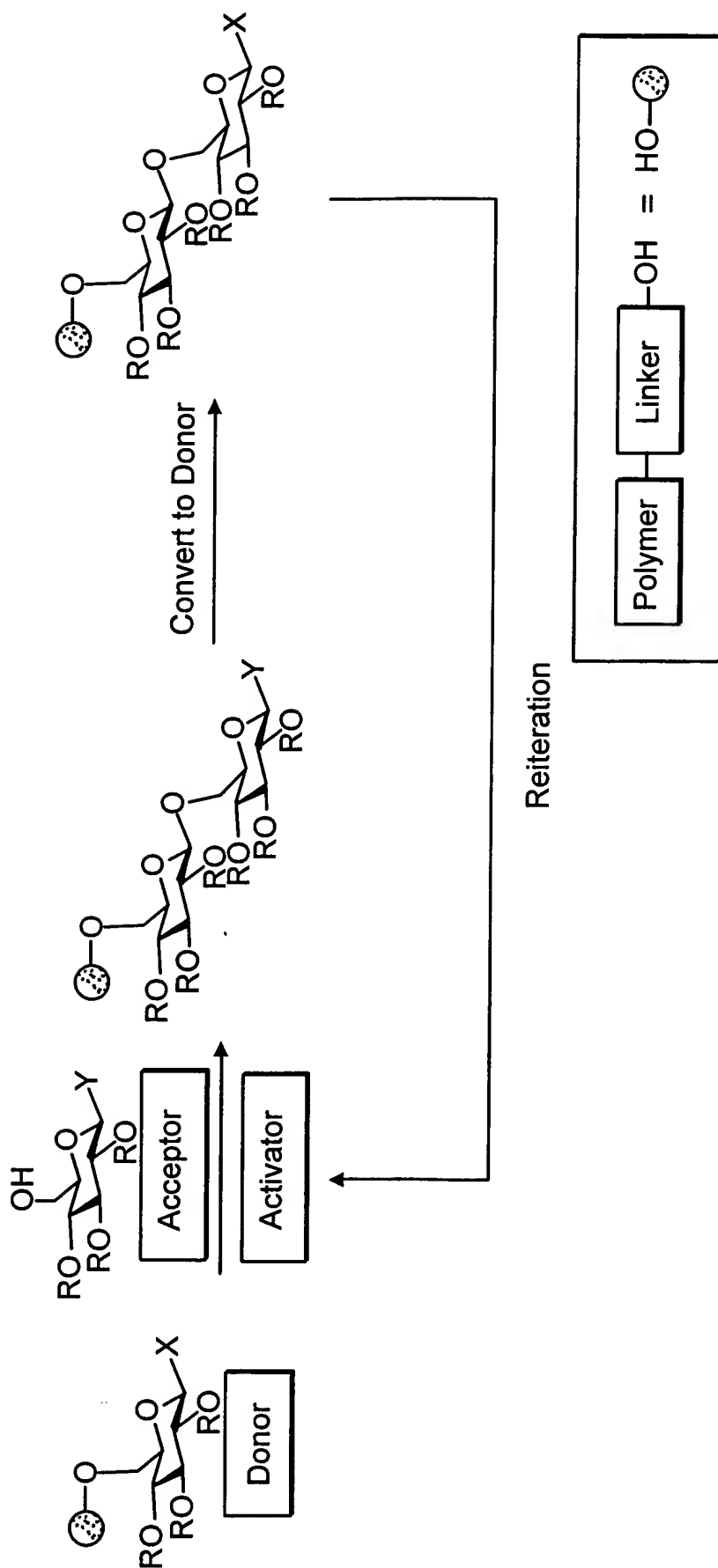
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2/22



Donor bound solid-phase carbohydrate synthesis

FIG. 2

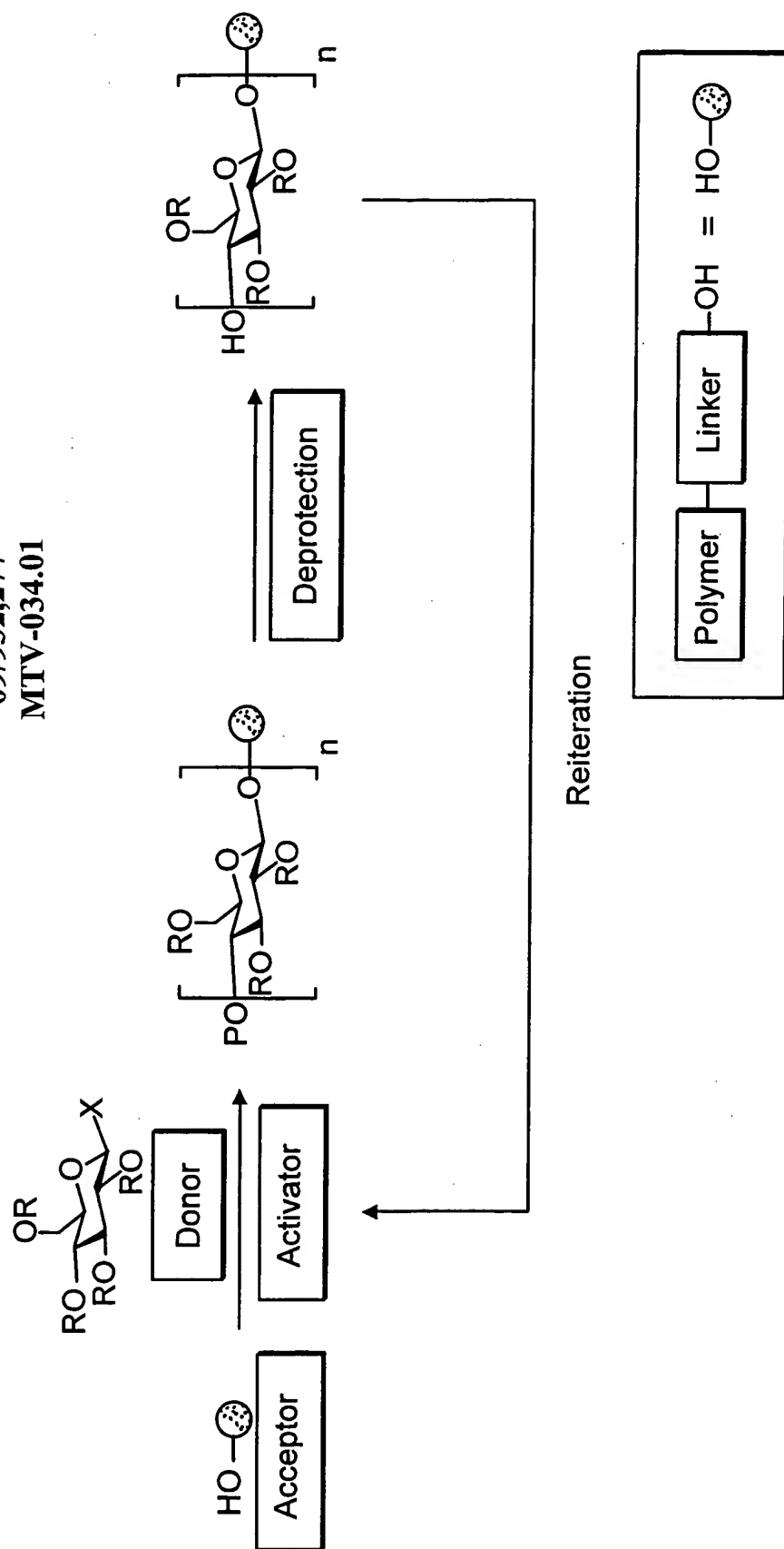
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3/22



Acceptor bound solid-phase carbohydrate synthesis

FIG. 3

oligonucleotides

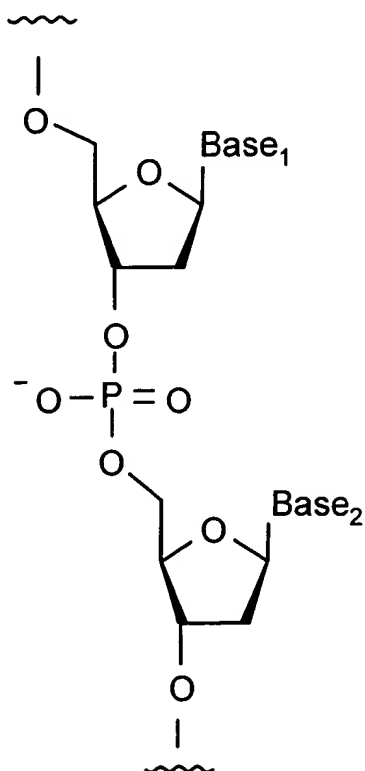


FIG. 4A

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oligopeptides

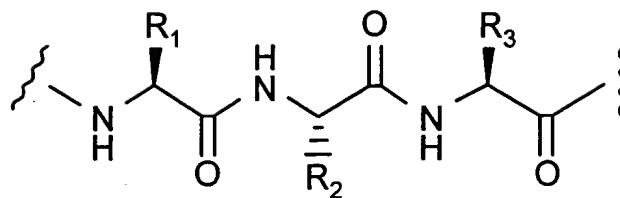


FIG. 4B

oligosaccharides

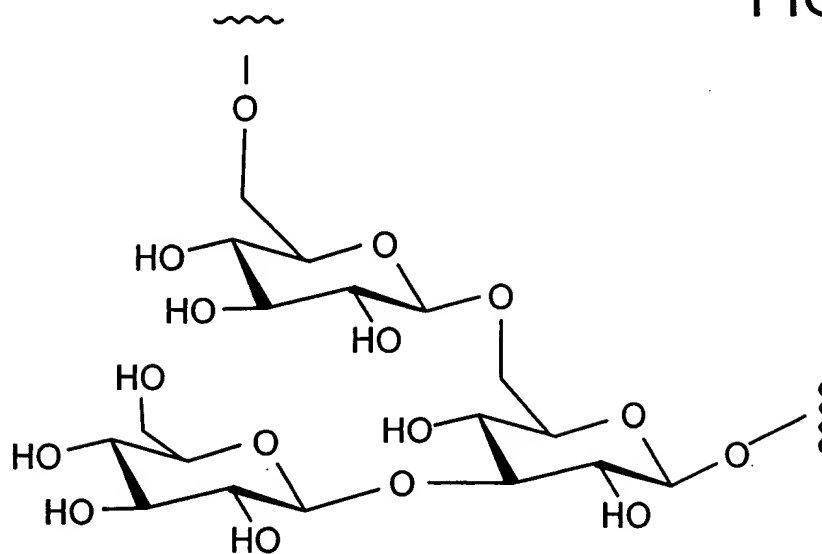
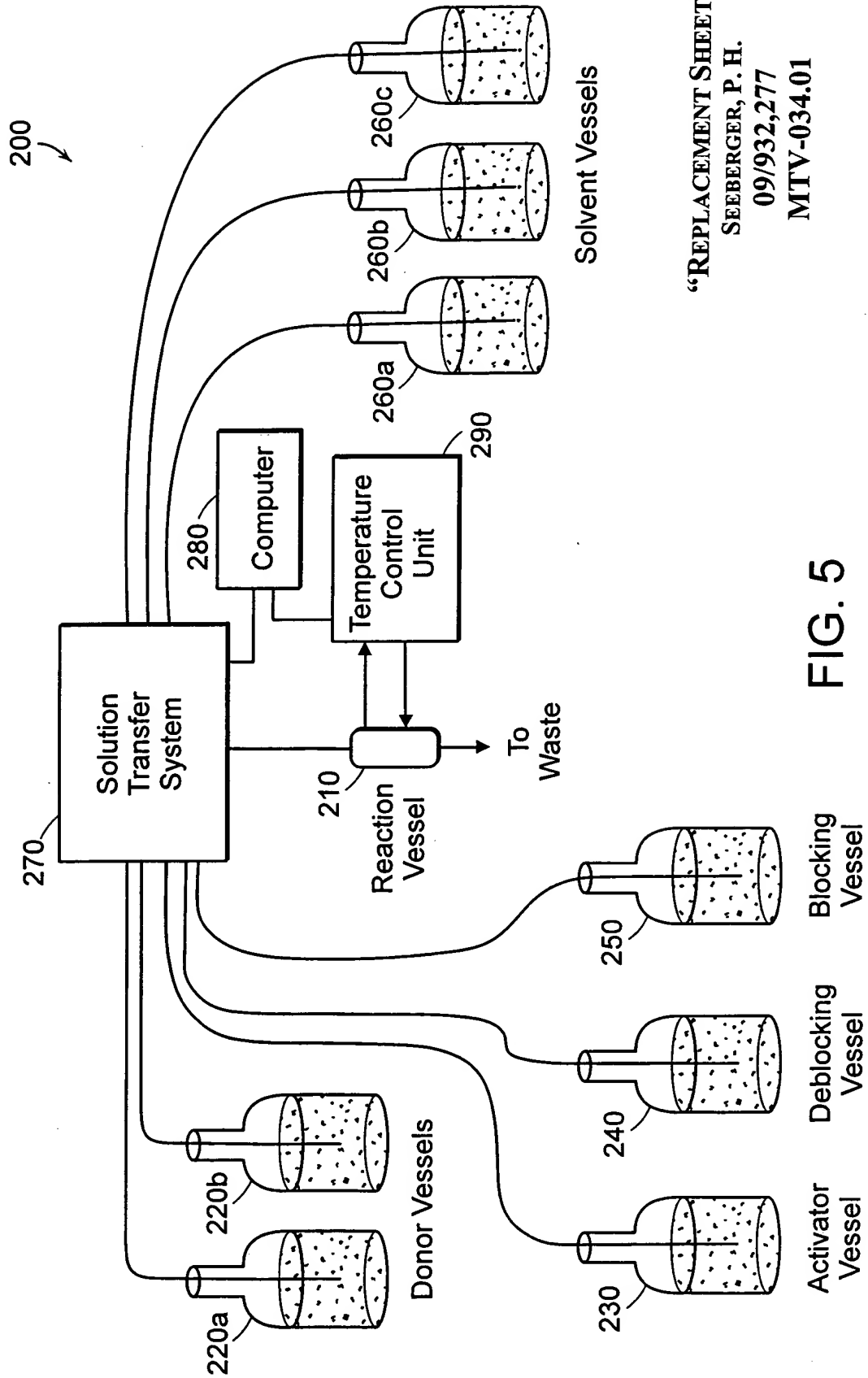


FIG. 4C

Automated Oligosaccharide Synthesizer



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FIG. 5

Automated Oligosaccharide Synthesizer

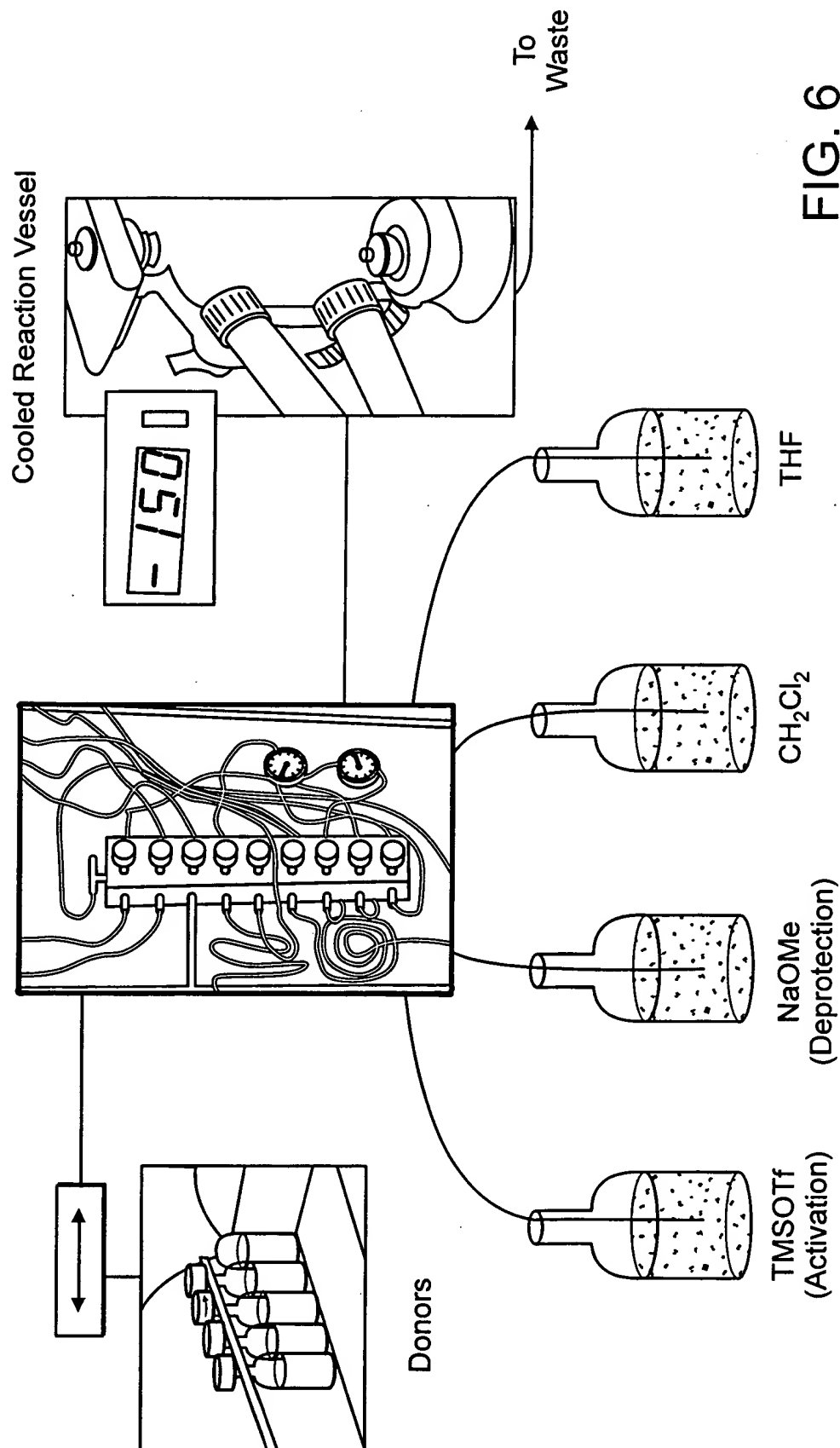


FIG. 6

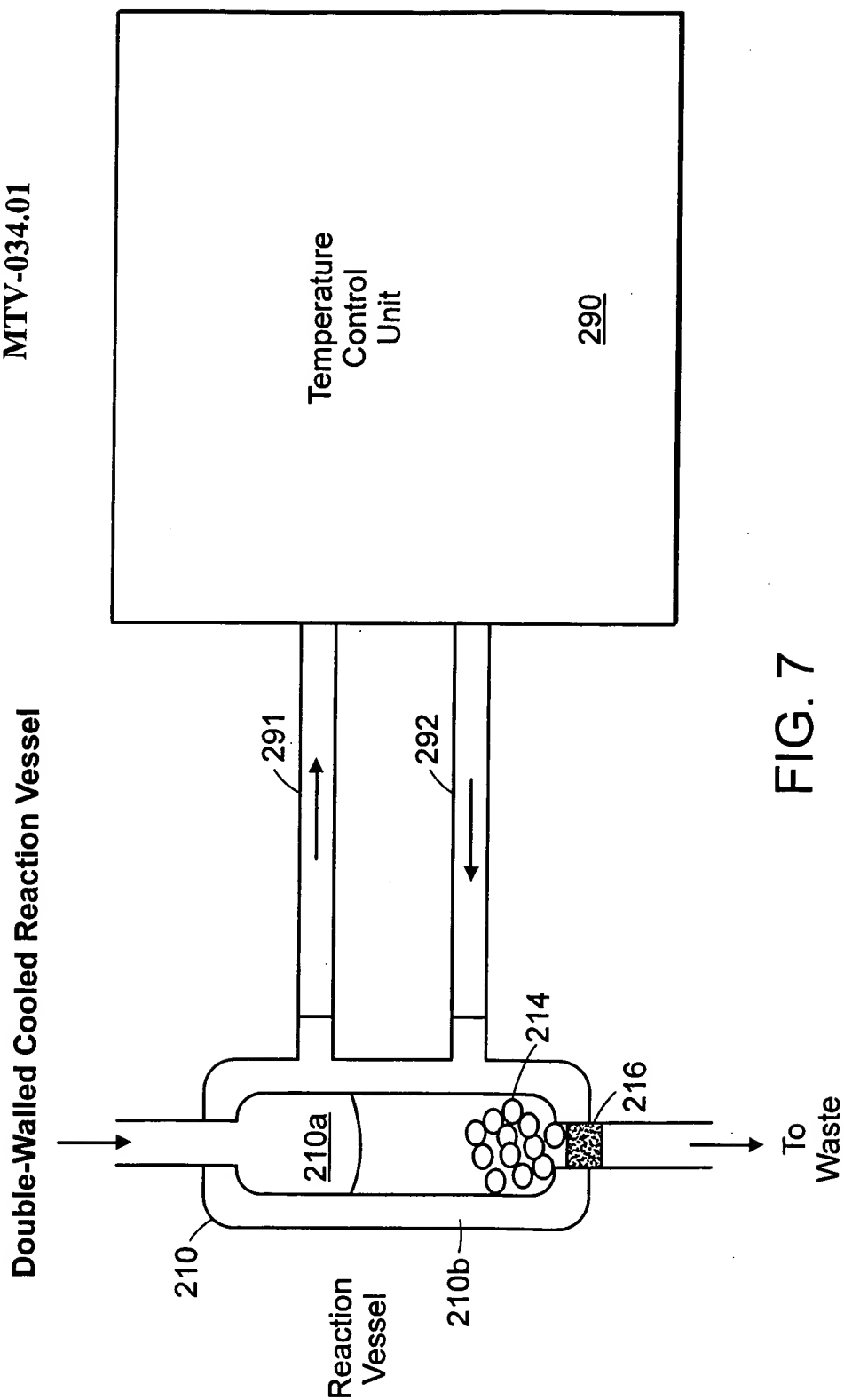


FIG. 7

8/22

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2D-NMR comparison of resin bound and solution phase pentamer

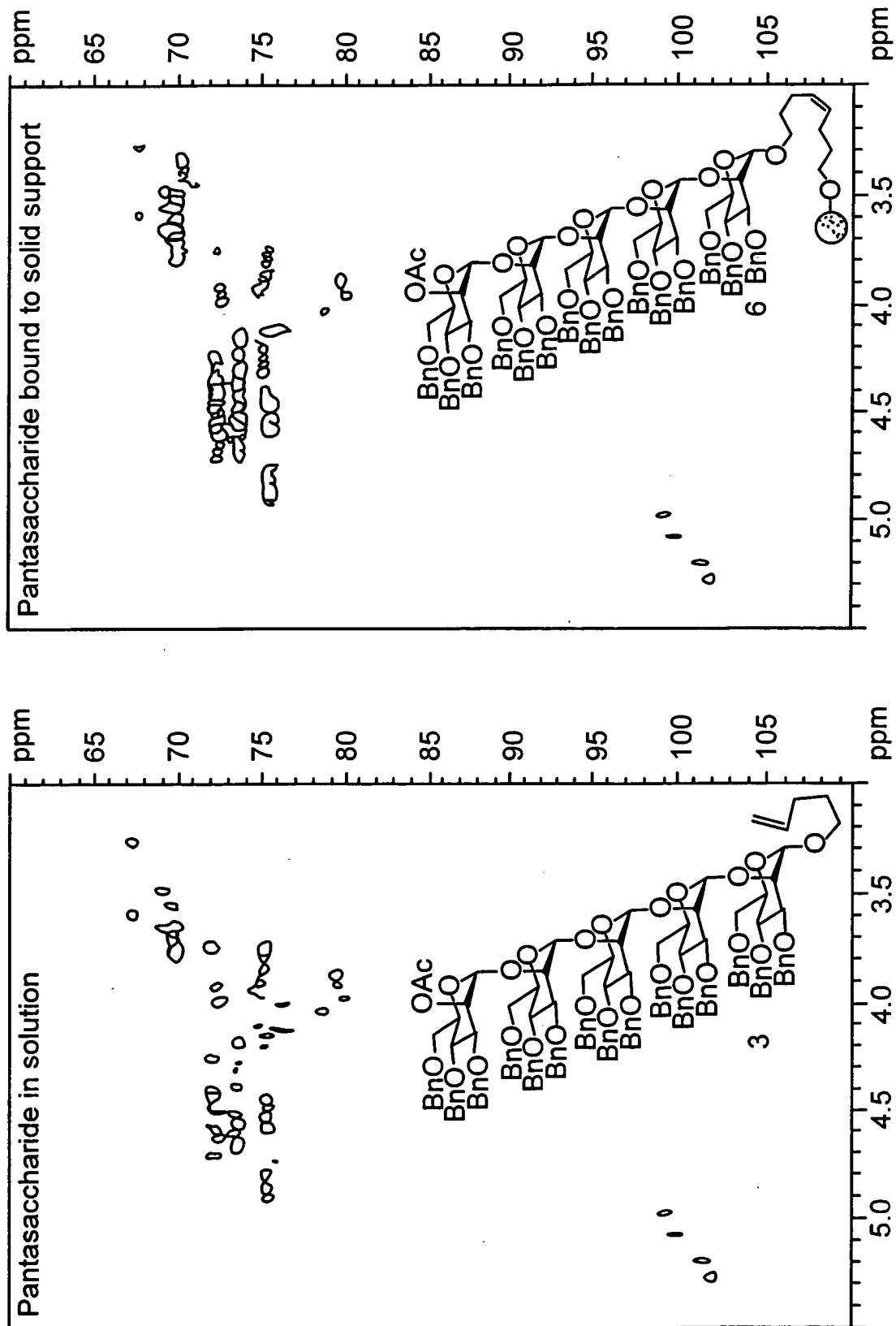


FIG. 8

9/22

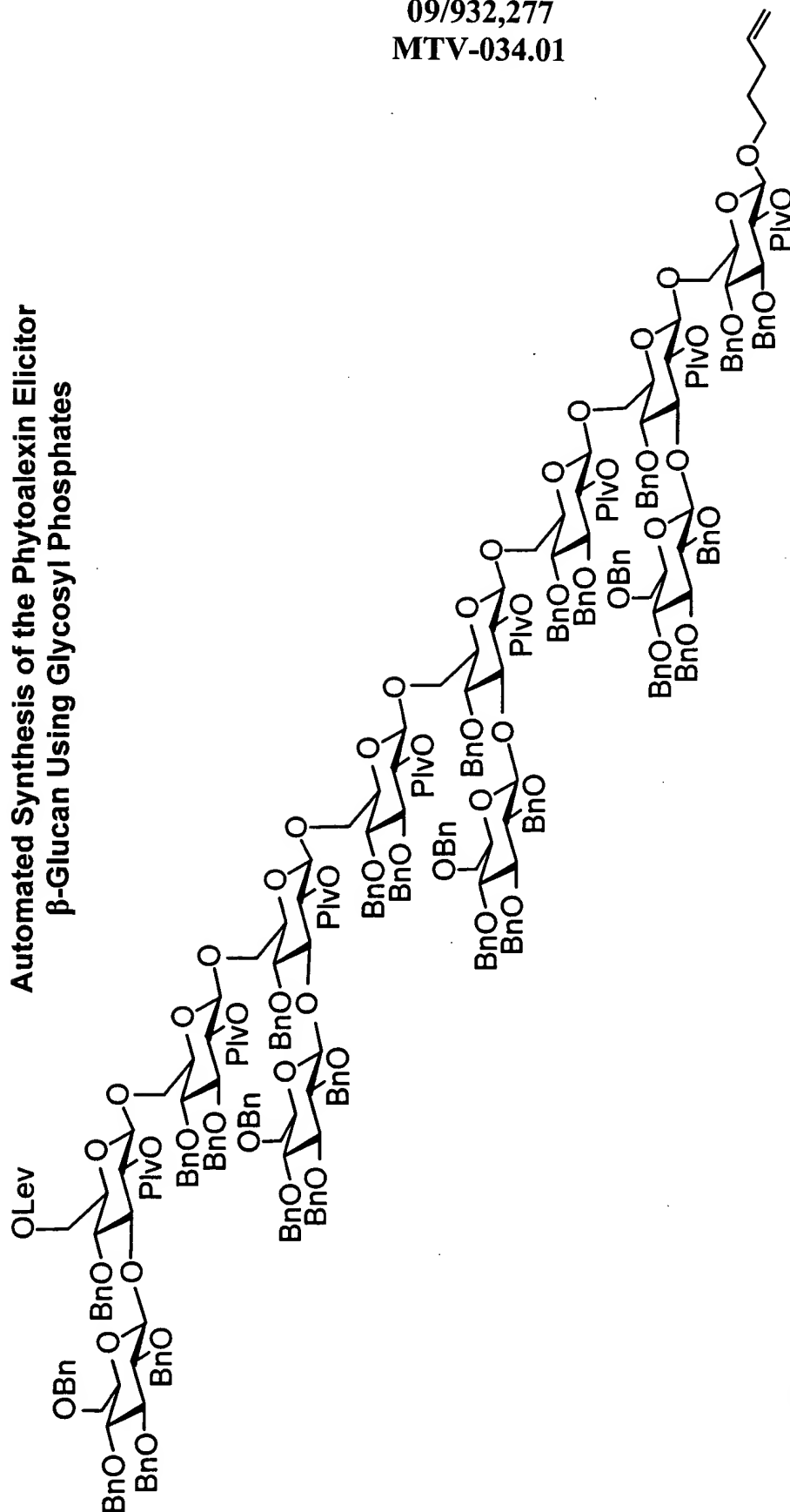
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**Automated Synthesis of the Phytoalexin Elicitor
β-Glucan Using Glycosyl Phosphates**



Prior syntheses:

Garegg et al. *Angew. Chem. Int. Ed.* 1983, 22, 793;

van Boom et al. *Chem. Eur. J.* 1995, 1, 16;

on soluble support: van Boom et al. *Recl. Trav. Chim. Pays-Bas* 1993; 112, 464;

on polymer support using trisaccharide blocks: Nicolaou et al. *Angew. Chem. Int. Ed.* 1998, 37, 1559.

FIG. 9

10/22

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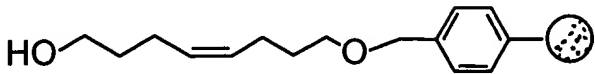
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Automated Oligosaccharide Synthesis

Chemical Issues:

- Choice of Resin (Merrifield's, Argopore, Tentagel)
- Linker: 
- Glycosylation Protocol
- Deprotection Protocol
- Capping Cycle
- Cleavage Method
- Purification Technique

Practical Issues:

- Scale (μmol -mmol)
- Cycle Development/Time
- Temperature Control Device

FIG. 10

11/22

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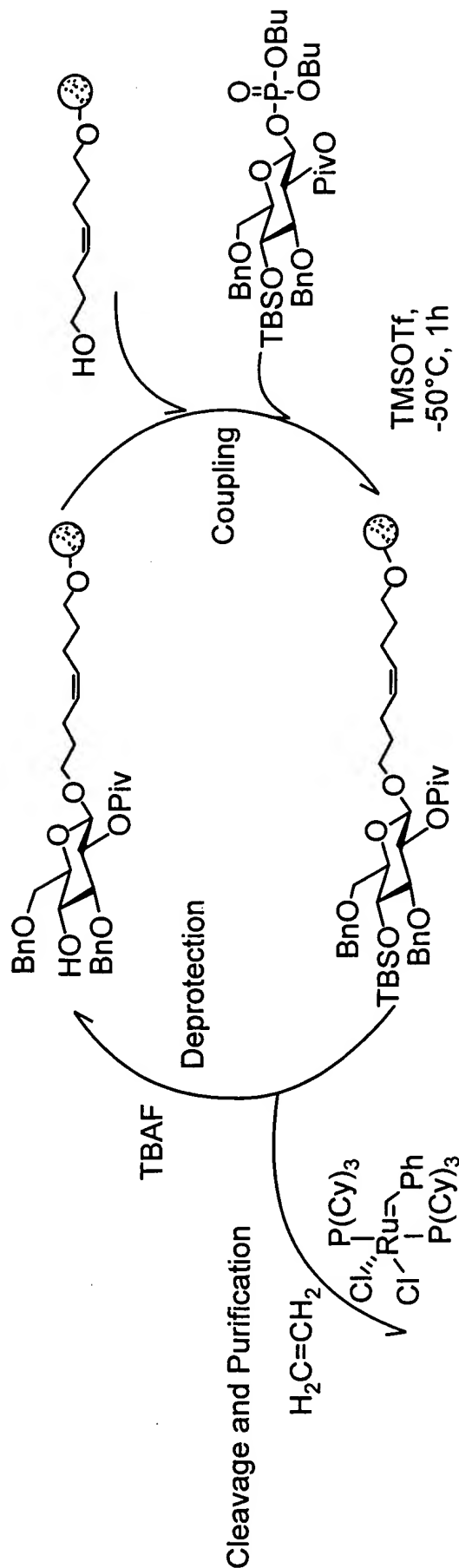
**Automated Oligosaccharide Synthesis with
Glycosyl Phosphates: Coupling Cycle**

	Reagent/Solvent	Equivalents	Temperature	Time
→ Coupling	Donor	5	-15°C	15 min
	TMSOTf	5		
Washing	CH ₂ Cl ₂			5 min
	THF			
Coupling	Donor	5	-15°C	15 min
	TMSOTf	5		
Washing	CH ₂ Cl ₂			5 min
	THF			
Deprotection	N ₂ H ₄ -HOAc		15°C	30 min
Washing	Pyr./AcOH			5 min
Deprotection	N ₂ H ₄ -HOAc		15°C	30 min
Washing	Pyr./AcOH			5 min
Cycle Time per residue				110 min

FIG. 11

12/22

Solid Support Oligosaccharide Synthesis:
Glycosyl Phosphate Donors



53% overall yield

Advantages:

- excess reagents drive reactions to completion
- purification only at the end of the synthesis

FIG. 12

Automated Hexasaccharide Synthesis Using Glycosyl Phosphates

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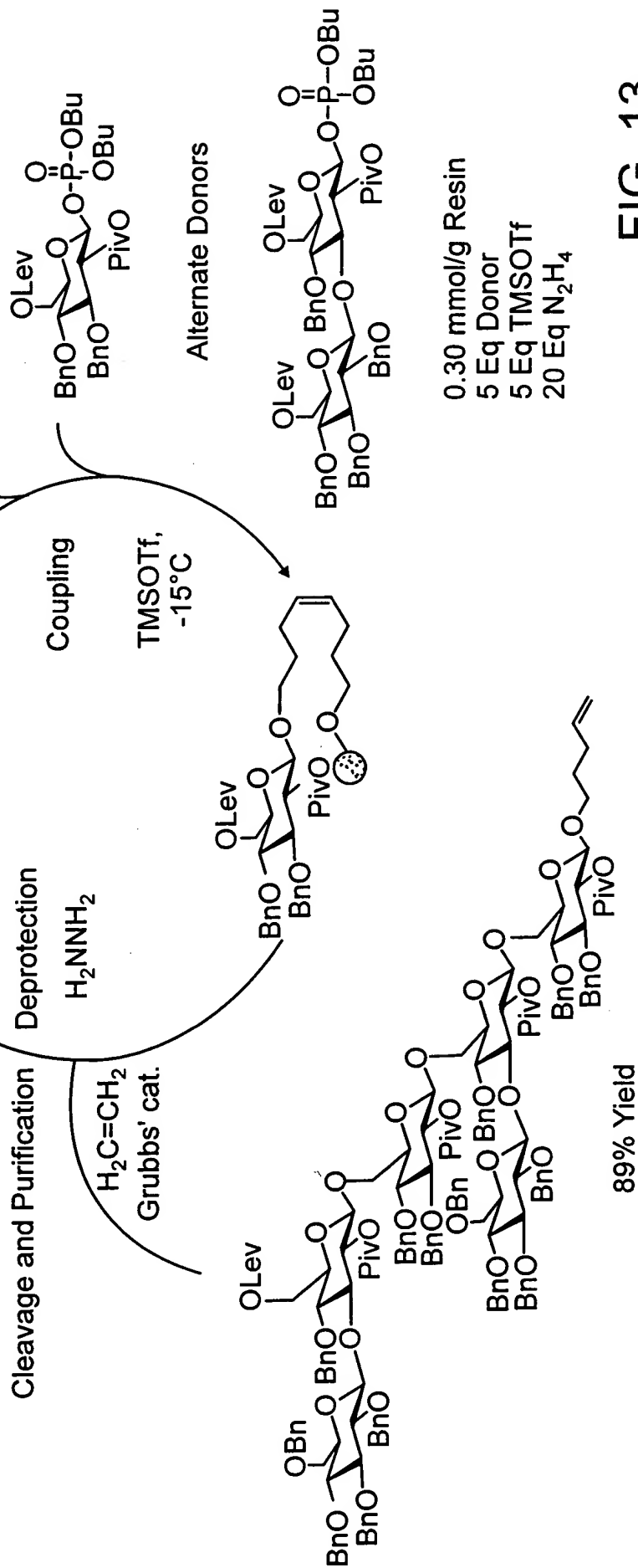


FIG. 13

14/22

Crude HPLC Profile of the Hexamer Synthesis

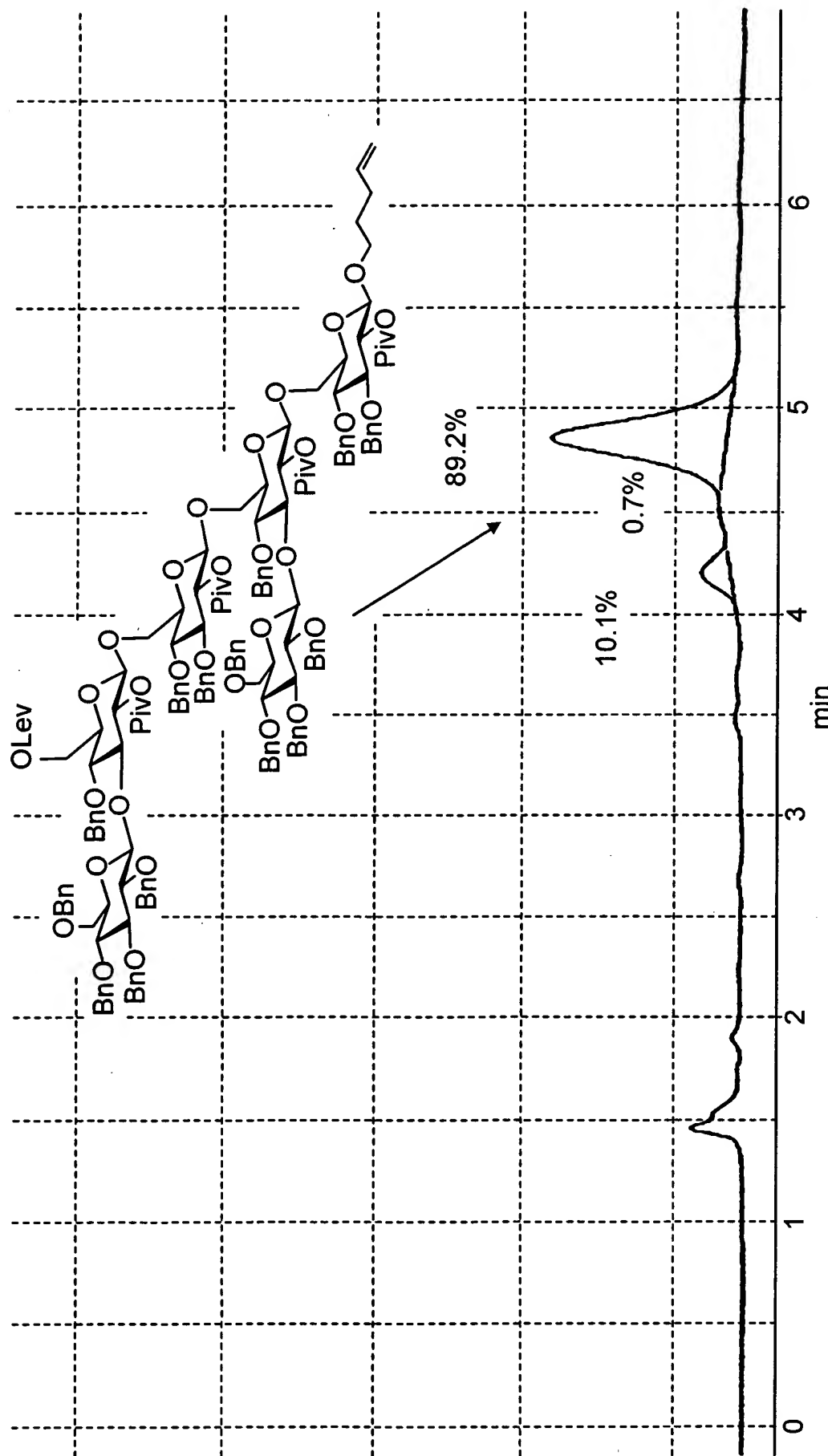


FIG. 14

15/22

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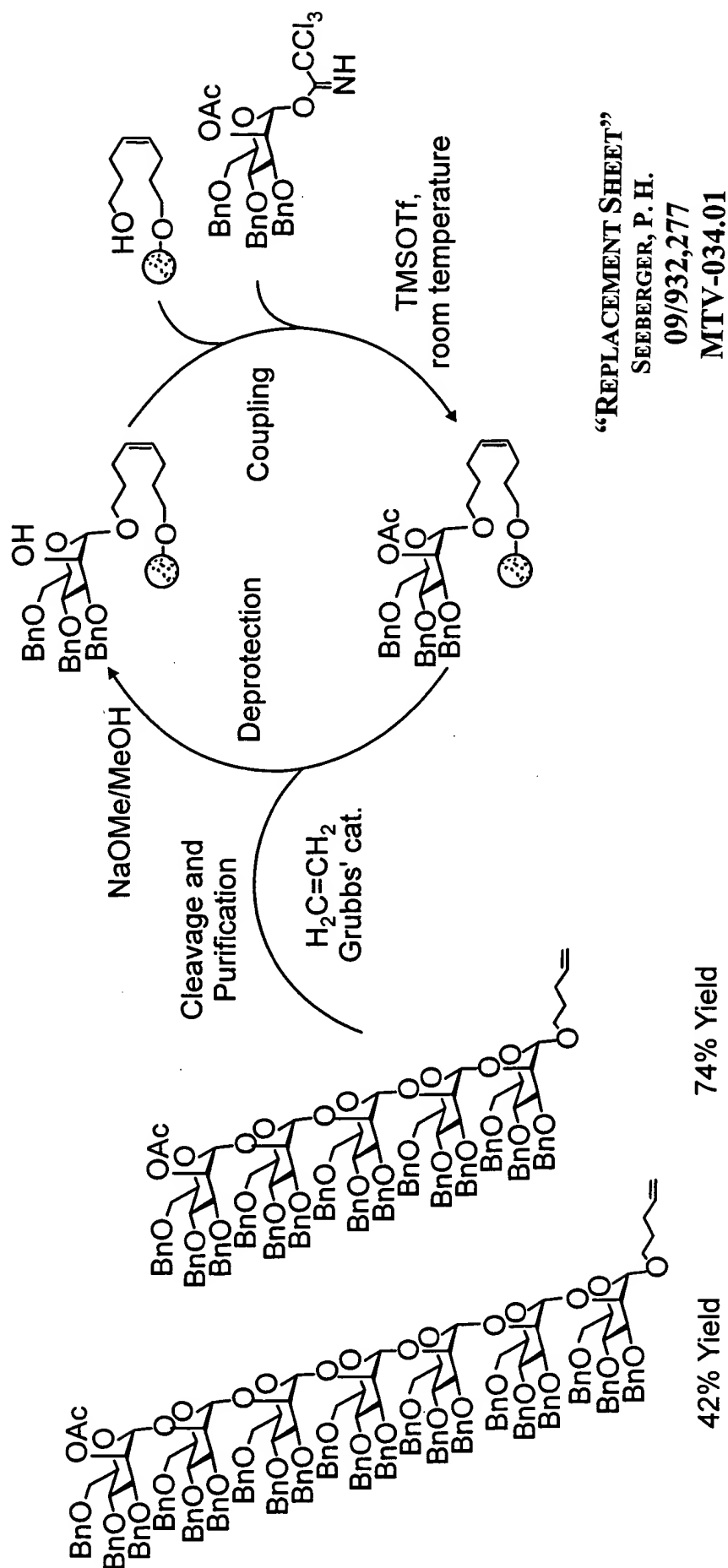
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**Automated Oligomannoside Synthesis:
Coupling Cycles**

	Reagent/Solvent	Equivalents	Time
	Coupling	Donor TMSOTf	10 0.5
	Washing	CH ₂ Cl ₂ THF	5 min
	Coupling	Donor TMSOTf	10 0.5
	Washing	CH ₂ Cl ₂ THF	5 min
	Deprotection	NaOMe	30 min
	Washing	CH ₂ Cl ₂ THF	5 min
	Deprotection	NaOMe	30 min
	Washing	CH ₂ Cl ₂ THF	5 min
25µmol Scale	Cycle Time per residue		140 min

FIG. 15

**Solid-Phase Oligosaccharide Synthesis:
Coupling Cycle Development**



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FIG. 16

17/22

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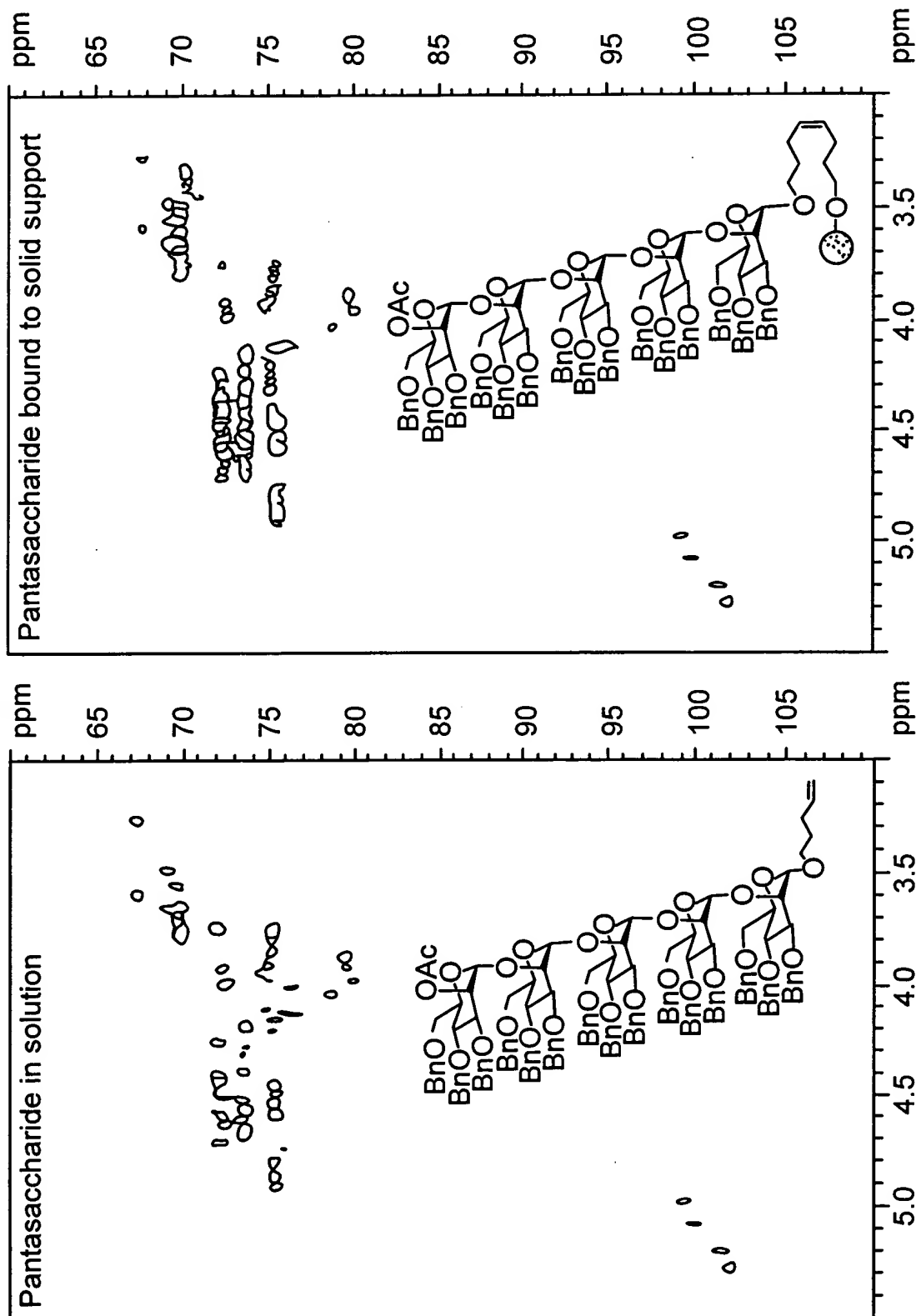
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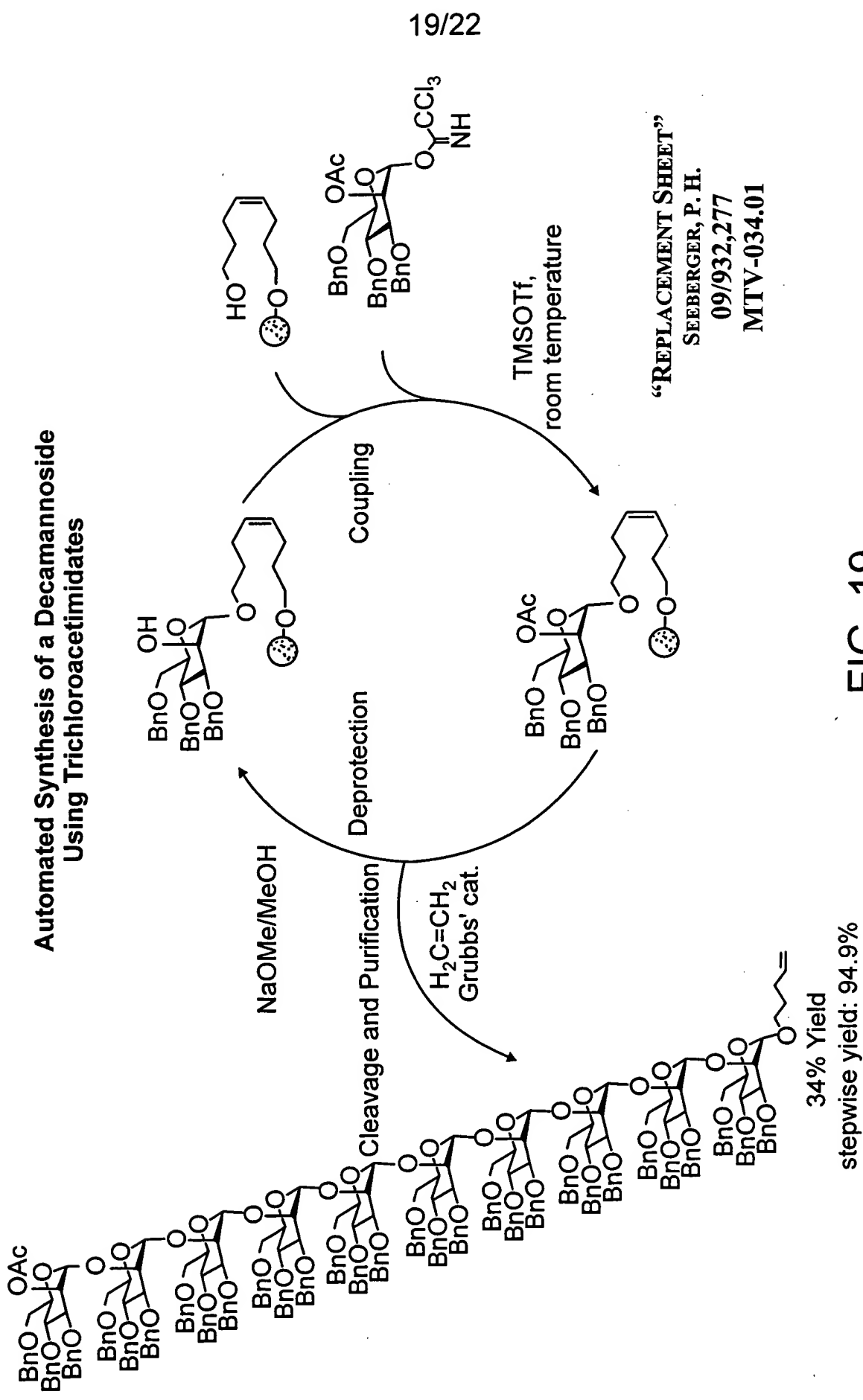
FIG. 17

HR-MAS HMQC-Analysis of Pentamannosides



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FIG. 18

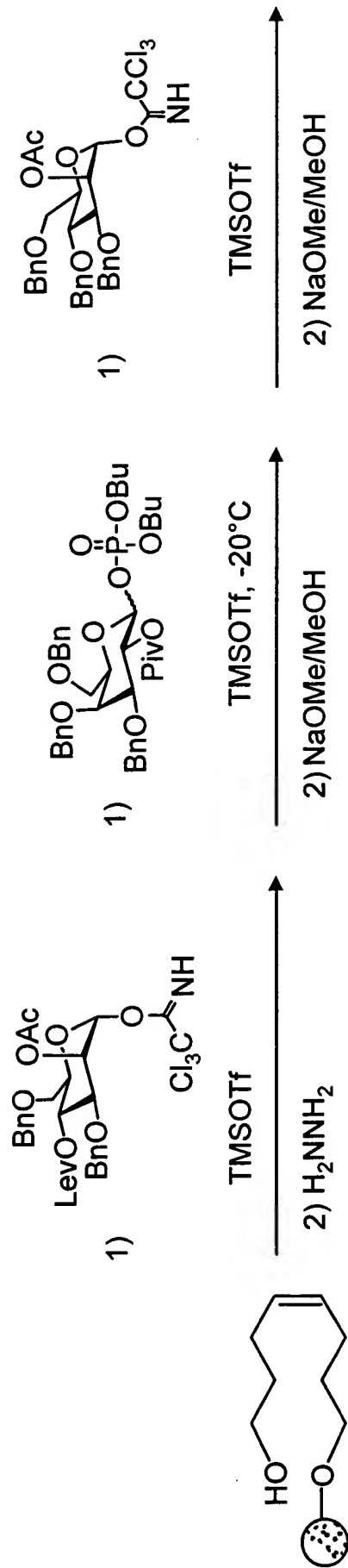


19/22

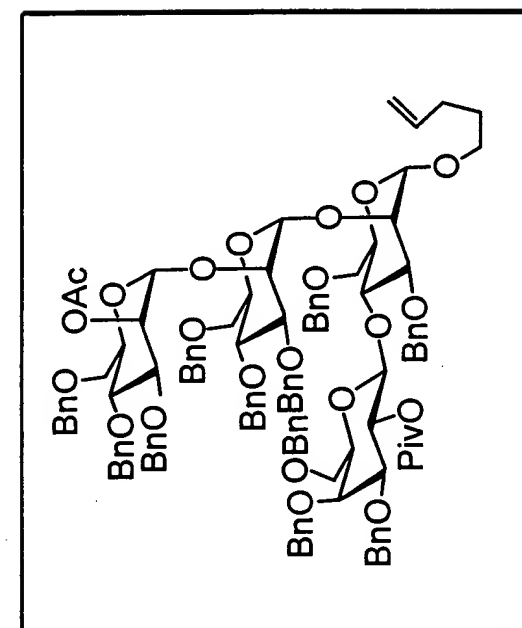
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FIG. 19

Automated Synthesis of Leishmania Cap Tetrasaccharide



20/22



66% yield

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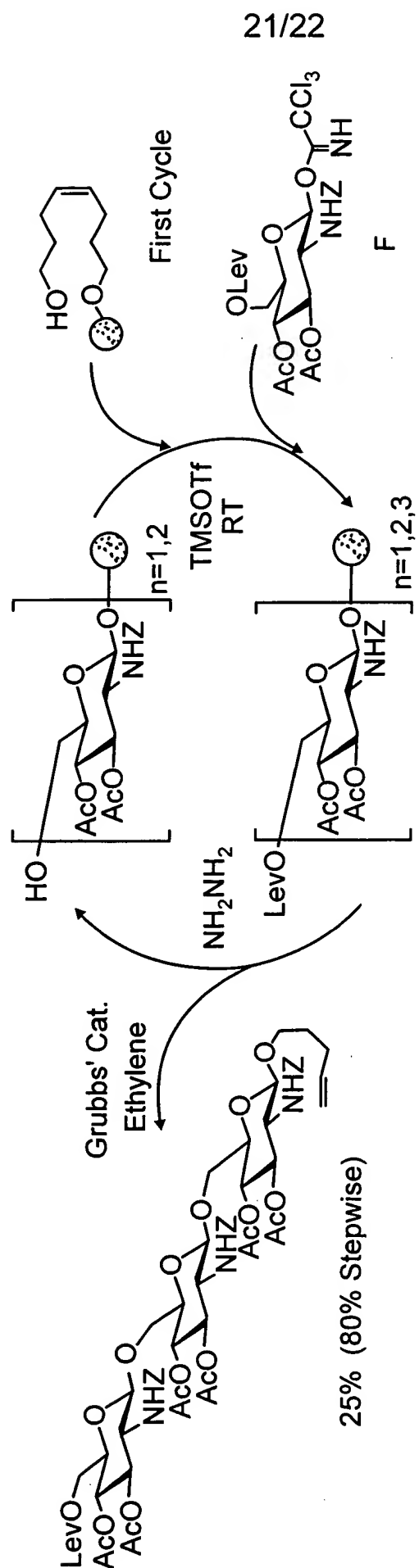
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FIG. 20

Automated Synthesis of GlcA Trisaccharide



Cycle:

Time: 8.5h

Donor: 5.0 eq

Activator: 0.5eq TMSOTf

Deprotection: 0.5 M $\text{NH}_2\text{NH}_2 \cdot \text{H}_2\text{O}$

FIG. 21

FIG. 22